WHAT IS CLAIMED IS:

1. A method for producing non-human, chimeric fetuses which comprises the following steps:

(i) obtaining an ICM of a blastocyst or ICM progenitor cells from preblastocyst stage embryo of a first genetic complement;

(ii) culturing said ICMs or ICM progenitor cells on a feeder layer culture under conditions which provide for the formation of multilayer cell colonies;

(iii) identifying from among the cells contained in the cultured ICM cell colony those cells which exhibit the following properties:

(a) small cytoplasmic/nuclear volume ratio;

(b) cytoplasmic vesicles;

(c) small individual cells relative to rest of the cell colony;

(iv) separating one or a cluster of said identified cells from the rest of the cell colony;

(v) passaging said separated ICM cells or ICM progenitor cells onto another feeder layer culture under conditions whereby there is at least some physical contact between the feeder cell layer and the separated cells or cell cluster to produce cultured inner cell mass (CICM) cells;

(vi) introducing the CICM cells developed from the first genetic complement into fertilized embryos of a second genetic complement to produce chimeric embryos;

(vii) transferring the chimeric embryos to recipient females; and,

(viii) permitting the transferred chimeric embryos to develop into chimeric fetuses.

2. The method of claim 1, wherein in step (vi) the CICM cells are introduced into the fertilized embryos by microinjection.

3. A chimeric fetus produced according to the method of claim 1.

4. The method of claim 1 including the additional step of allowing the recipient females to give birth to chimeric animals as a result of carrying the chimeric fetuses to term.

5. A chimeric animal produced according to the method claim 4.

6. The chimeric animal of claim 5 wherein at least one of its gametes has been transformed with DNA of the first genetic complement.

7. Transgenic offspring produced by breeding the chimeric animal of claim 6.

8. A method for producing non-human, transgenic chimeric fetuses which comprises the following steps:

(i) obtaining an ICM of a blastocyst or ICM progenitor cells from preblastocyst stage embryo;

(ii) culturing said ICMs or ICM progenitor cells on a feeder layer culture under conditions which provide for the formation of multilayer cell colonies;

(iii) identifying from among the cells contained in the cultured ICM cell colony those cells which exhibit the following properties:

(a) small cytoplasmic/nuclear volume ratio;

(b) cytoplasmic vesicles;

(c) small individual cells relative to rest of the cell colony;

(iv) separating one or a cluster of said identified cells from the rest of the cell colony;

(v) passaging said separated ICM cells or ICM progenitor cells onto another feeder layer culture under conditions whereby there is at least some physical contact be-

tween the feeder cell layer and the separated cells or cell cluster to produce cultured inner cell mass (CICM) cells;

(vi) inserting heterologous DNA into said CICM cells;

(vii) selecting for transgenic CICM cells;

(viii) introducing the transgenic CICM cells into fertilized embryos to produce transgenic chimeric embryos;

(ix) transferring the transgenic chimeric embryos to recipient females; and,

(x) permitting the transferred transgenic chimeric embryos to develop into transgenic chimeric fetuses.

9. The method of claim 8, wherein in step (vi) the heterologous DNA is introduced into the CICM cells by microinjection.

10. The method of claim 8, wherein in step (vii) the selection for the transgenic CICM cells is conducted *in vitro*.

11. The method of claim 8, wherein in step (viii) the transgenic CICM cells are introduced into the fertilized embryos by microinjection.

12. A transgenic chimeric fetus produced according to the method of claim 8.

13. The method of claim 8 including the additional step of allowing the recipient females to give birth to transgenic chimeric animals as a result of carrying the transgenic chimeric fetuses to term.

14. A transgenic chimeric animal produced according to the method claim 13.

15. The transgenic chimeric animal of claim 14 wherein the heterologous DNA is in the germ cells and can be transmitted to progeny of the transgenic chimeric animal.

16. Transgenic offspring produced by breeding the transgenic chimeric animal of claim 15.

17. A method for producing non-human, genetically identical fetuses which comprises the following steps:

(i) obtaining an ICM of a blastocyst or ICM progenitor cells from preblastocyst stage embryo;

(ii) culturing said ICMs or ICM progenitor cells on a feeder layer culture under conditions which provide for the formation of multilayer cell colonies;

(iii) identifying from among the cells contained in the cultured ICM cell colony those cells which exhibit the following properties:

(a) small cytoplasmic/nuclear volume ratio;

(b) cytoplasmic vesicles;

(c) small individual cells relative to rest of the cell colony;

(iv) separating one or a cluster of said identified cells from the rest of the cell colony;

(v) passaging said separated ICM cells or ICM progenitor cells onto another feeder layer culture under conditions whereby there is at least some physical contact between the feeder cell layer and the separated cells or cell cluster to produce cultured inner cell mass (CICM) cells;

(vi) introducing nuclei of the CICM cells into enucleated oocytes or enucleated, preimplantation embryonic cells to produce embryos;

(vii) transferring the embryos produced in step (vi) to recipient females; and,

(viii) permitting the transferred embryos to develop into fetuses.

18. The method of claim 17, wherein in step (vi) the nuclei of the CICM cells are introduced into the enucleated oocytes or enucleated, preimplantation embryonic cells by electrofusion.

19. The method of claim 17, wherein in step (vi) the nuclei of the CICM cells are introduced into the enucleated oocytes or enucleated, preimplantation embryonic cells by microinjection.

20. A fetus produced according to the method of claim 17.

21. The method of claim 17 including the additional step of allowing the recipient females to give birth to animals as a result of carrying the fetuses to term.

22. An animal produced according to the method claim 21.

23. Offspring produced by breeding the animal of claim 22.

24. A method for producing non-human, transgenic, genetically identical fetuses which comprises the following steps:

(i) obtaining an ICM of a blastocyst or ICM progenitor cells from preblastocyst stage embryo;

(ii) culturing said ICMs or ICM progenitor cells on a feeder layer culture under conditions which provide for the formation of multilayer cell colonies;

(iii) identifying from among the cells contained in the cultured ICM cell colony those cells which exhibit the following properties:

(a) small cytoplasmic/nuclear volume ratio;

(b) cytoplasmic vesicles;

(c) small individual cells relative to rest of the cell colony;

(iv) separating one or a cluster of said identified cells from the rest of the cell colony;

(v) passaging said separated ICM cells or ICM progenitor cells onto another feeder layer culture under conditions whereby there is at least some physical contact between the feeder cell layer and the separated cells or cell cluster to produce cultured inner cell mass (CICM) cells;

(vi) inserting heterologous DNA into said CICM cells;

(vii) selecting for transgenic CICM cells;

(viii) introducing nuclei of the transgenic CICM cells into enucleated oocytes or enucleated, preimplantation embryonic cells to produce transgenic embryos;

(ix) transferring the transgenic embryos to recipient females; and,

(x) permitting the transferred transgenic embryos to develop into transgenic fetuses.

25. The method of claim 24, wherein in step (vi) the heterologous DNA is introduced into the CICM cells by microinjection.

26. The method of claim 24, wherein in step (vii) the selection for the transgenic CICM cells is conducted *in vitro*.

27. The method of claim 24, wherein in step (viii) the nuclei of the transgenic CICM cells are introduced into the enucleated oocytes or enucleated, preimplantation embryonic cells by electrofusion.

28. The method of claim 24, wherein in step (viii) the nuclei of the transgenic CICM cells are introduced into the enucleated oocytes or enucleated, preimplantation embryonic cells by microinjection.

29. A transgenic fetus produced according to the method of claim 24.

30. The method of claim 24 including the additional step of allowing the recipient females to give birth to transgenic animals as a result of carrying the transgenic fetuses to term.

31. A transgenic animal produced according to the method claim 30.

32. Transgenic offspring produced by breeding the transgenic animal of claim 31.

33. A method for producing transgenic chimeric ungulate fetuses which comprises the following steps:

(i) producing inner cell mass (CICM) cells derived from the ICM of a blastocyst or derived from ICM progenitor cells obtained from a preblastocyst ungulate embryo wherein said CICM maintains in culture the morphological characteristics and express cell markers identically or substantially similarly to ICMs of developing ungulate embryos;

(ii) inserting heterologous DNA into said CICM cells;

(iii) selecting for transgenic CICM cells;

(iv) introducing the transgenic CICM cells into fertilized ungulate embryos to produce transgenic chimeric ungulate embryos;

(v) transferring the transgenic chimeric ungulate embryos to recipient ungulate females; and,

(vi) permitting the transferred transgenic chimeric ungulate embryos to develop into transgenic chimeric ungulate fetuses.

34. The method of claim 33, wherein in step (iii) the selection for the transgenic CICM cells is conducted *in vitro*.

35. The method of claim 33 wherein the ungulate is a pig.

36. The method of claim 33 wherein the ungulate is a cow.

37. A transgenic chimeric ungulate fetus produced according to the method of claim 33.

38. The method of claim 33 including the additional step of allowing the recipient ungulate females to give birth to transgenic chimeric ungulates as a result of carrying the transgenic chimeric ungulate fetuses to term.

39. A transgenic chimeric ungulate produced according to the method of claim 38.

40. The transgenic chimeric ungulate of claim 39 wherein the heterologous DNA is in the germ cells and can be transmitted to progeny of the transgenic chimeric ungulate.

41. Transgenic offspring produced by breeding the transgenic chimeric ungulate of claim 40.

42. A method for producing transgenic, genetically identical ungulate fetuses which comprises the following steps:

(i) producing inner cell mass (CICM) cells derived from the ICM of a blastocyst or derived from ICM progenitor cells obtained from a preblastocyst ungulate embryo wherein said CICM maintains in culture the morphological characteristics and express cell markers identically or substantially similarly to ICMs of developing ungulate embryos;

(ii) inserting heterologous DNA into said CICM cells;

(iii) selecting for transgenic CICM cells;

(iv) introducing nuclei of the transgenic CICM cells into enucleated oocytes or enucleated, preimplantation embryonic cells to produce transgenic ungulate embryos;

(v) transferring the transgenic ungulate embryos to recipient ungulate females; and,

(vi) permitting the transferred transgenic ungulate embryos to develop into transgenic ungulate fetuses.

43. The method of claim 42, wherein in step (ii) the heterologous DNA is introduced into the CICM cells by microinjection.

44. The method of claim 42, wherein in step (iii) the selection for the transgenic CICM cells is conducted *in vitro*.

45. The method of claim 42, wherein in step (iv) the nuclei of the transgenic CICM cells are introduced into the enucleated oocytes or enucleated, preimplantation embryonic cells by electrofusion.

46. The method of claim 42, wherein in step (iv) the nuclei of the transgenic CICM cells are introduced into the enucleated oocytes or enucleated, preimplantation embryonic cells by microinjection.

47. The method of claim 42 wherein the ungulate is a pig.

48. The method of claim 42 wherein the ungulate is a cow.

49. A transgenic ungulate fetus produced according to the method of claim 42.

50. The method of claim 42 including the additional step of allowing the recipient ungulate females to give birth to transgenic ungulates as a result of carrying the transgenic ungulate fetuses to term.

51. A transgenic ungulate produced according to the method of claim 50.

52. Transgenic offspring produced by breeding the transgenic ungulate of claim 51.

53. A method for producing transgenic chimeric ungulate fetuses which comprises the following steps:

(i) obtaining ungulate ICM cells or an established cultured ungulate ICM cell line;

(ii) introducing into the nucleus of said ICM cells or established cultured ICM cell line one or more genes which inhibit differentiation of said ICM cells or cell line;

(iii) culturing the resultant transgenic chimeric ungulate ICM cells or cell line on a suitable feeder cell culture under conditions which inhibit differentiation and provide for the production of a multilayer cell colony to obtain cultured inner cell mass (CICM) cells which exhibit morphological characteristics and which express cellular markers consistent with or substantially similarly to that of ICMs of differentiating ungulate embryos for prolonged periods in tissue culture;

(iv) inserting heterologous DNA into said CICM cells;

(v) selecting for transgenic CICM cells;

(vi) introducing the transgenic CICM cells into fertilized ungulate embryos to produce transgenic chimeric ungulate embryos;

(vii) transferring the transgenic chimeric ungulate embryos to recipient ungulate females; and,

(viii) permitting the transferred transgenic chimeric ungulate embryos to develop into transgenic chimeric ungulate fetuses.

54. The method of claim 53, wherein in step (iv) the heterologous DNA is introduced into the CICM cells by microinjection.

55. The method of claim 53, wherein in step (v) the selection for the transgenic CICM cells is conducted *in vitro*.

56. The method of claim 53 wherein the ungulate is a pig.

57. The method of claim 53 wherein the ungulate is a cow.

58. A transgenic chimeric ungulate fetus produced according to the method of claim 53.

59. The method of claim 53 including the additional step of allowing the recipient ungulate females to give birth to transgenic chimeric ungulates as a result of carrying the transgenic chimeric ungulate fetuses to term.

60. A transgenic chimeric ungulate produced according to the method of claim 59.

61. The transgenic chimeric ungulate of claim 60 wherein the heterologous DNA is in the germ cells and can be transmitted to progeny of the transgenic chimeric ungulate.

62. Transgenic offspring produced by breeding the transgenic chimeric ungulate of claim 61.

63. A method for producing transgenic, genetically identical ungulate fetuses which comprises the following steps:

(i) obtaining ungulate ICM cells or an established cultured ungulate ICM cell line;

(ii) introducing into the nucleus of said ICM cells or established cultured ICM cell one or more genes which inhibit differentiation of said ICM cells or cell line;

(iii) culturing the resultant transgenic chimeric ungulate ICM cells or cell line on a suitable feeder cell culture under conditions which inhibit differentiation and provide for the production of a multilayer cell colony to

obtain cultured inner cell mass (CICM) cells which exhibit morphological characteristics and which express cellular markers consistent with or substantially similarly to that of ICMs of differentiating ungulate embryos for prolonged periods in tissue culture;

(iv) inserting heterologous DNA into said CICM cells;

(v) selecting for transgenic CICM cells;

(vi) introducing nuclei of the transgenic CICM cells into enucleated oocytes or enucleated, preimplantation embryonic cells to produce transgenic ungulate embryos;

(vii) transferring the transgenic ungulate embryos to recipient ungulate females; and,

(viii) permitting the transferred transgenic ungulate embryos to develop into transgenic ungulate fetuses.

64. The method of claim 63, wherein in step (iv) the heterologous DNA is introduced into the CICM cells by microinjection.

65. The method of claim 63, wherein in step (v) the selection for the transgenic CICM cells is conducted *in vitro*.

66. The method of claim 63, wherein in step (vi) the nuclei of the transgenic CICM cells are introduced into the enucleated oocytes or enucleated, preimplantation embryonic cells by electrofusion.

67. The method of claim 63, wherein in step (vi) the nuclei of the transgenic CICM cells are introduced into the enucleated oocytes or enucleated, preimplantation embryonic cells by microinjection.

68. The method of claim 63 wherein the ungulate is a pig.

69. The method of claim 63 wherein the ungulate is a cow.

70. A transgenic ungulate fetus produced according to the method of claim 63.

71. The method of claim 63 including the additional step of allowing the recipient ungulate females to give birth to transgenic ungulates as a result of carrying the transgenic ungulate fetuses to term.

72. A transgenic ungulate produced according to the method of claim 71.

73. Offspring produced by breeding the transgenic ungulate of claim 72.

74. The method of claim 53 or claim 63 wherein said genes which inhibit differentiation are selected from the group consisting of tsA58, OCT3, LIF, LIF receptor and other oncogene products or T antigens.

75. The method of claim 53 or claim 63 wherein said genes which inhibit differentiation are expressed under the control of an inducible promoter and the culturing conditions comprise those which induce said promoter.

76. The method of claim 53 or claim 63 wherein said ICM cells are passaged.

77. The method of claim 53 or claim 63 wherein said ICM cells are passaged with a passaging method which comprises:

(i) culturing said ICMs on a feeder layer culture under conditions which provide for multilayer cell colonies;

(ii) identifying from among the cultured ICM cell colony those cells which exhibit the following properties:

(a) small cytoplasmic/nuclear volume ratio;

(b) cytoplasmic vesicles;

(c) small individual cells relative to rest of the cell colony;

(iii) separating one or a cluster of said identified ICM cells from the rest of the cell colony by suitable means; and

(iv) passaging said separated cultured ICM cells onto another feeder layer culture under conditions whereby there is at least some physical contact between the feeder cell layer and the separated cells or cell cluster.

78. The method of Claim 77, wherein in step (iv) the separated passaged ICM cells include some associated feeder cells.